

## WHAT IS CLAIMED IS:

1           1.    A method for manufacturing an isolation trench in a  
2 semiconductor device, said method comprising the steps of:  
3           providing a substrate for said semiconductor device;  
4           etching a trench in said substrate;  
5           growing a silicon dioxide liner in said trench;  
6           filling said trench with polysilicon material; and  
7           depositing polysilicon material on top of said filled trench  
8 to protect said silicon dioxide liner.

1           2.    The method as set forth in Claim 1 wherein said step of  
2 depositing polysilicon material on top of said filled trench to  
3 protect said silicon dioxide liner comprises the step of:  
4           forming said polysilicon material that is placed on top of  
5 said filled trench with portions that extend laterally over an  
6 edge of said filled trench.

1           3.    The method as set forth in Claim 1 wherein said step of  
2 growing a silicon dioxide liner in said trench further comprises  
3 the step of:  
4           growing said silicon dioxide liner on horizontal portions of  
5 said substrate that are adjacent to an edge of said filled trench.

1           4.    The method as set forth in Claim 3 wherein said step of  
2   depositing polysilicon material on top of said filled trench to  
3   protect said silicon dioxide liner comprises the step of:

4           forming said polysilicon material that is placed on top of  
5   said filled trench with portions that extend laterally over said  
6   horizontal portions of said substrate at an edge of said filled  
7   trench that is covered with silicon dioxide liner.

1           5.    The method as set forth in Claim 4 further comprising the  
2   step of:

3           placing a layer of oxidation material over said polysilicon  
4   material that is placed on top of said filled trench during a  
5   subsequent oxidation process.

1           6.    The method as set forth in Claim 1 further comprising  
2   the step of:

3           selecting an initial height of said polysilicon material that  
4   is deposited on top of said filled trench that is sufficient  
5   for said polysilicon material to survive one of: at least  
6   one subsequent etch procedure and at least one subsequent  
7   oxidation procedure.

1        7.    A method for manufacturing an isolation trench in a  
2 semiconductor device, said method comprising the steps of:

3        providing a monocrystalline silicon substrate layer for said  
4 semiconductor device;

5        applying a silicon dioxide layer over said monocrystalline  
6 silicon substrate layer;

7        applying a layer of photoresist over said silicon dioxide  
8 layer;

9        exposing and developing said photoresist from a trench area;

10       etching portions of said silicon dioxide layer in said trench  
11 area;

12       removing said photoresist;

13       etching a trench in said trench area of said monocrystalline  
14 silicon substrate layer;

15       etching portions of said silicon dioxide layer to pull back  
16 said silicon dioxide layer from an edge of said trench;

17       growing a silicon dioxide liner in said trench;

18       filling said trench with polysilicon material; and

19       depositing polysilicon material on top of said filled trench  
20 to protect said silicon dioxide liner.

1           8.    The method as set forth in Claim 7 wherein said step of  
2   depositing polysilicon material on top of said filled trench to  
3   protect said silicon dioxide liner comprises the step of:

4           forming said polysilicon material that is placed on top of  
5   said filled trench with portions that extend laterally over an  
6   edge of said filled trench.

1           9.    The method as set forth in Claim 7 wherein said step of  
2   growing a silicon dioxide liner in said trench further comprises  
3   the step of:

4           growing said silicon dioxide liner on horizontal portions of  
5   said substrate that are adjacent to an edge of said filled trench.

1           10.   The method as set forth in Claim 9 wherein said step of  
2   depositing polysilicon material on top of said filled trench to  
3   protect said silicon dioxide liner comprises the step of:

4           forming said polysilicon material that is placed on top of  
5   said filled trench with portions that extend laterally over said  
6   horizontal portions of said substrate at an edge of said filled  
7   trench that is covered with silicon dioxide liner.

1        11. The method as set forth in Claim 10 further comprising  
2 the step of:

3        placing a layer of oxidation material over said polysilicon  
4 material that is placed on top of said filled trench during a  
5 subsequent oxidation process.

1        12. The method as set forth in Claim 7 further comprising  
2 the step of:

3        selecting an initial height of said polysilicon material that  
4 is deposited on top of said filled trench that is sufficient  
5 for said polysilicon material to survive one of: at least  
6 one subsequent etch procedure and at least one subsequent  
7 oxidation procedure.

1        13. An isolation trench for use in a semiconductor device  
2 comprising:

3        a substrate of said semiconductor device;  
4        a trench etched in said substrate;  
5        a silicon dioxide liner grown in said trench;  
6        polysilicon material filling said trench; and  
7        polysilicon material deposited on top of said filled trench to  
8 protect said silicon dioxide liner.

1        14. The isolation trench as set forth in Claim 13 wherein  
2 said polysilicon material that is deposited on top of said filled  
3 trench to protect said silicon dioxide liner comprises:

4        a portion of said polysilicon material that extends laterally  
5 over an edge of said filled trench.

1        15. The isolation trench as set forth in Claim 13 further  
2 comprising silicon dioxide liner grown on horizontal portions of  
3 said substrate that are adjacent to an edge of said filled trench.

1        16. The isolation trench as set forth in Claim 15 wherein  
2 said polysilicon material that is deposited on top of said filled  
3 trench to protect said silicon dioxide liner comprises:

4        a portion of polysilicon material that extends laterally over  
5 said horizontal portions of said substrate at an edge of said

6 filled trench that is covered with silicon dioxide liner.

1 17. The isolation trench as set forth in Claim 16 further  
2 comprising a layer of oxidation material placed over said  
3 polysilicon material that is placed on top of said filled trench.

1 18. The isolation trench as set forth in Claim 13 wherein  
2 said polysilicon material that is deposited on top of said filled  
3 trench has an initial height that is sufficient for said  
4 polysilicon material to survive one of: at least one subsequent  
5 etch procedure and at least one subsequent oxidation procedure.

1 19. The isolation trench as set forth in Claim 13 wherein  
2 said polysilicon material that is deposited on top of said filled  
3 trench is capable of expanding vertically and laterally.

1 20. The isolation trench as set forth in Claim 13 wherein  
2 said polysilicon material that is deposited on top of said filled  
3 trench does not create stress in said substrate.